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The principles described in the preceding section define the essential goals and guiding ideas for the vision of the San Diego River Park. The recommendations that follow describe specific strategies for achieving the intent of the principles.

It is important to note that while each recommendation fits into a larger, comprehensive vision for the river, no single recommendation is meant to address every location or every situation along the length of the river corridor. The Master Plan’s single overarching recommendation is one of flexibility, seeking opportunities as they arise with property owners to implement the Plan’s ideas.

The San Diego River Park is many parks and one park. In the initial part of this section, the general and reach-specific recommendations address measures to improve elements of the river corridor, create new parks and expand recreational and habitat resources. Five key recommendations are identified that apply to all reaches of the river and extend beyond the valley itself linking the entire river corridor into a coherent system. The remainder of the section is organized by general recommendations relating to four elements of the San Diego River Park: Hydrology and Water Quality, Habitat and Wildlife, Recreation and Cultural Interpretation, and Public Art. The general recommendations are followed by Specific Recommendations for each reach.

The Hydrology, Habitat and Wildlife, Recreation and Culture, and Public Art each have a set of related benefits and influences that interrelate. These multiple elements must be considered in the implementation of every facet of the River Park, especially in confined areas. Each recommendation must be considered in the context of how it influences and is influenced by its effect on other systems, and how it can be woven into the fabric of the City itself. Every action taken toward creating the San Diego River Park, large scale and small must consider the role it plays as a part of the whole, to reinforce the perception of the river, valley and canyons as a complete natural and urban system.

The vision of the San Diego River Park crosses boundaries of land ownership, special interests, disciplines and jurisdictions; the ultimate whole is greater than the sum of its parts. Creating the San Diego River Park will require a multi-disciplinary approach and the collaboration and cooperation of a diverse group of public and private entities to implement the many discrete but interrelated elements.

Many of the ideas expressed in the Principles and Recommendations in this plan were first discussed thirty years ago in Kevin Lynch’s *Temporary Paradise* and further developed in the *San Diego River Conceptual Plan*. In addition, the *City of Villages Plan* incorporates the idea of using the open space and the transit corridor of the river to link and define the communities along the river. The San Diego River Park will create an interesting sequence of places with unique characteristics that stem from the natural conditions of each reach and community.



An example of where nature, river and city meet along the San Diego River



Exploring the edge of the San Diego River near Carlton Oaks Golf Course

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Key Recommendations:

Return the river to health.

Improve the river pattern and water quality by separating stream flow from ponds; look for opportunities to create a wider riparian corridor with more meander. Improving water quality will allow the river to support all other beneficial uses including wildlife habitat and recreation. Remove invasive non-native vegetation and plant a diversity of native species to re-establish a range of native plant communities.

Remember the big picture.

Connect the valley to adjacent open space including the beaches, Mission Bay Park, Tecolote, Murray, Ruffin, Murphy, Elanus, Bachman, Collwood, Alvarado and Navajo Canyons, and Mission Trails Regional Park, to create an ecostructure of a unified native landscape by transforming rights-of-way, acquiring land and creating easements.

Build city wide connection.

Establish a continuous trail system from the ocean to Mission Trails Regional Park and from canyon to canyon with frequent access to transit, canyons and neighborhoods. Coordinate with Community Plans, the San Diego Bicycle Master Plan, adjacent jurisdictions and other current planning efforts to develop specific locations for neighborhood connections and route alignments.

Assemble a beautiful infrastructure.

Integrate infrastructure (transportation, utilities, stormwater) and ecostructure (rivers, vegetation, wildlife corridors, habitat) into “beautiful infrastructure” making key ecological and infrastructure functions visible. Partner with public agencies to transform roads, bridges, the trolley, parking lots, culverts, channels and utility easements to be part of a unified landscape, maintaining and enhancing connections between adjacent natural habitats, residential communities, and the San Diego River Park.

Create a sequence of unique places and experiences.

Establish a linked string of parks and open spaces through land acquisition, easements and partnerships with land owners in key locations. These open spaces will serve a variety of needs providing valuable protected habitat in some places and access to the river and connection to adjacent development in others. The opportunity to educate visitors about all of the different stories about the river is part of all of these places. Collaborate with and support community planning efforts to identify areas for redevelopment and new development to have a river focus, to identify potential land to acquire for parks and open space. As redevelopment occurs, engage land owners and developers in the San Diego River Park process to support the creation of places that are mutually beneficial.



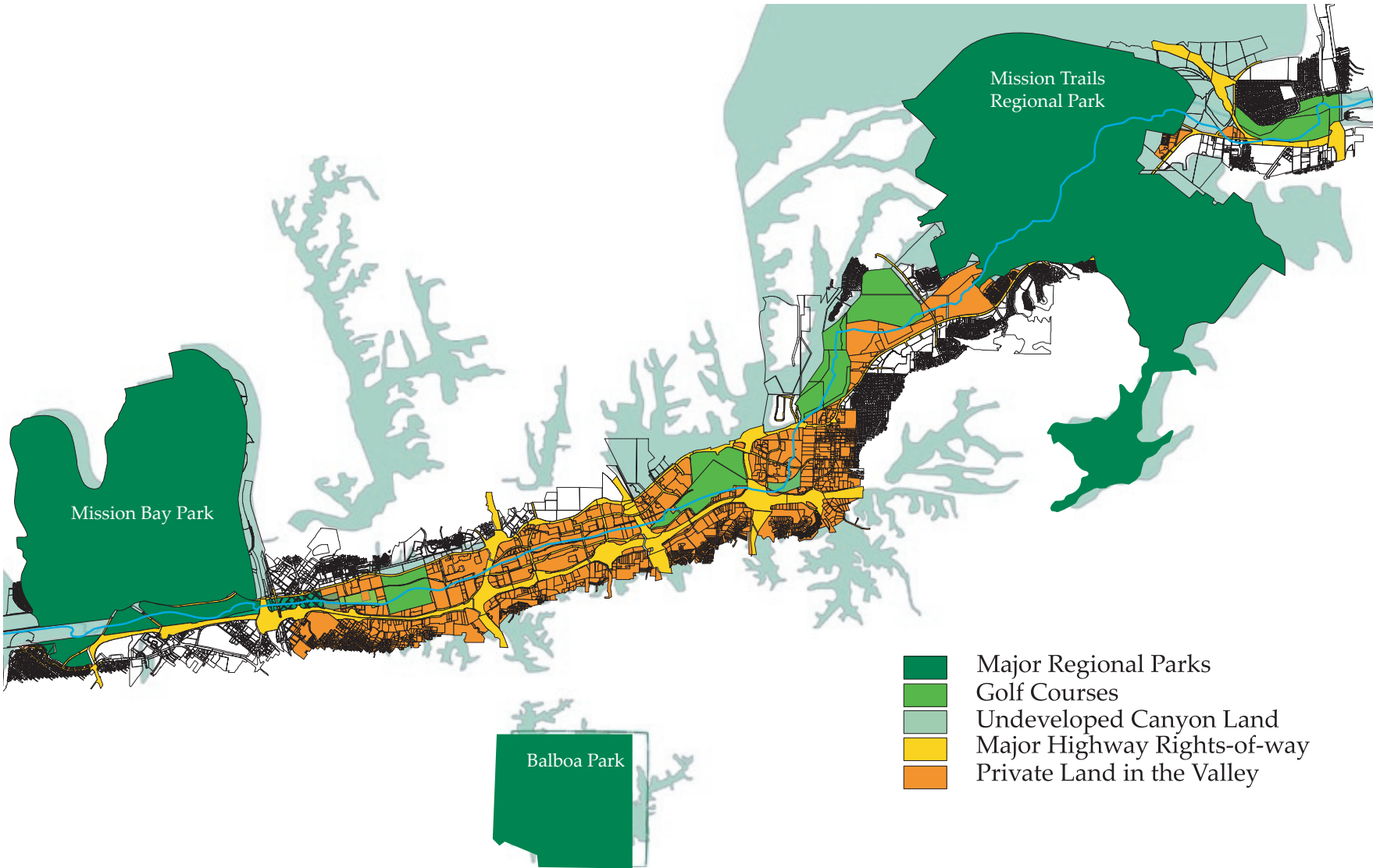
Connecting habitat and open space such as Tecolote Canyon



Trail connections will link neighborhoods with the river



Flowing river in Mission Trails Regional Park



Parks, open space and highway rights-of-way combine infrastructure with ecostructure

General Recommendations:

Hydrology and Water Quality

Intent

The San Diego River Park will create a healthier river, one that flows with cleaner water and invites people to see, visit, smell, and listen to it. A healthy San Diego River will become the symbol and embodiment of the river valley’s natural character.

The San Diego River Park seeks to return the San Diego River to a cleaner, healthier condition that showcases a naturalistic California river within the City’s urban setting. To create a healthy San Diego River specific benchmarks must be met:

- It will be free flowing from Old Mission Dam to the ocean.
- It will be meandering, braided, and free of ponds.
- It will be bordered with native riparian vegetation that provides habitat for wildlife and filtration of urban runoff.

The creation of the San Diego River Park in the City of San Diego can not lead to a cleaner river on its own. The river is impacted along its entire length and the entire watershed must be considered, as the impacts of inland sources of pollutants impair water quality downstream and in coastal environments many miles away.

A healthy river does not, however, mean returning the river to its pre-impoundment flow, unpredictable and ephemeral; such an approach is neither achievable or desirable. While the current year-round flow has been a factor in supporting extensive invasion by exotic species, it will ensure a reliable water supply to maintain diverse and healthy natural riparian habitat.

Human activity has pushed and squeezed the river for decades, resulting in constrictions, channelization and ponds, both from mining and for flood control. The San Diego River Park should look for opportunities to separate river flow from ponds, remove river constrictions, and broaden the width of the river’s meander belt (that portion of the flood plain in which the river alters its course as a result of a major flood event) to allow the necessary width for meandering and braiding. These improvements will result in a longer river, which will in turn expand riparian habitat and improve water quality through the increased duration of water contact with soil and vegetation.

Recommendations

Seek opportunities to:

- Augment flows to the river periodically.
- Remove/circumvent obstacles that impede flow.
- Remove invasive vegetation species.
- Encourage the growth of appropriate riparian vegetation.
- Re-contour the channel to encourage meander and braiding.
- Expand the floodplain.
- Adopt programs to reduce/remove non-point source loads of pollutants and prevent pollutants from entering the river at their source.
- Incorporate hydrology & water quality considerations in all future planning and guidance documents
- Provide interpretive information regarding the value of the river, clean water, and importance and process of rehabilitating the river.
- Explore potential to benefit from reclaimed water.

Augment flows to the river.

Although the pre-disturbed condition of the river was one of ephemeral flows (dry during certain times of the year), the persistent condition is now perennial flows (at least some flow all year long). It is unlikely that flow in the river will be dramatically augmented by natural or non-accidental means. Rather, the extreme demand for a consistent water supply for human use and increasing attention to water efficiency make it more likely that flow in the river will continue to diminish during the dry season. The result of reverting to an ephemeral, or semi-ephemeral system, whether through conservation or conscious design, would be a more barren riparian corridor supporting less biodiversity than present conditions.

The existing perennial flow supports a relatively abundant riparian biological community, and for this reason the flow should be maintained to some degree. The river’s perennial flow is most likely the result of return flow from urban and suburban activities such as irrigation. The flow is also augmented by some contribution from groundwater sources. The relative contribution from each of these sources is not well understood at this time and will require further investigation. Means to augment the flow should also be investigated; reclaimed wastewater might be a possible source for the augmentation, as would water purchased for release. Regardless of source, the water should closely mimic existing river conditions in measures such as temperature and salinity, and augmented flow should occur periodically, to mimic historic patterns of flow. These seasonal pulse flows also offer the opportunity for sediment transport and would create disturbance/recovery cycles for ecosystems. The potential to augment flows should be fully explored with the Padre Dam Municipal Water District and Regional Water Quality Control Board.

Remove/circumvent obstacles that impede flow.

Numerous impediments exist in the channel and in most of the streams and creeks that are tributary to the channel. These disconnects include ponds, lakes, culverts, roads, and dams. These elements segment habitat, disrupt water flow and create barriers for species movement. The flow of the river is inadequate to sufficiently flush the ponds, leading it to collect into standing pools, particularly where historic gravel mining has removed material from the river channel. The relatively shallow pools and minimal flow lead to an increase in water temperature, promoting algae/macrophyte growth, both serious issues for riparian systems. The still water also promotes a deposition of sediments resulting in downstream deprivation of sediment load.

Planning efforts that encourage the removal and/or circumvention of impediments to improve flow characteristics and reconnect habitat fragments should be continued. However, the water volume, pond depth and the flow conditions of the river in various reaches will affect the specific conditions of each pond. As the River Park and adjacent land is designed and developed, each pond should be studied specifically to create the best and most appropriate hybrid that is most beneficial to improving the water quality of the river, expanding native plant communities and adding value to adjacent development. While the ponds have a negative effect on the hydrology of the river, they offer recreation and community opportunities for fishing, boating, birding and other activities. It is beneficial to the river to separate the channel from the ponds, but with aeration and other treatments the ponds can remain as assets to the River Park.



Historic gravel mining has resulted in numerous ponds

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Remove invasive vegetation species.

As it relates to hydrology and water quality, the presence of dense, invasive vegetation results in an impediment to flow. Invasive species also result in dramatically increased evapotranspiration of water that would otherwise remain in the channel or be used by more productive species. In an effort to reduce flow impediments and better utilize the limited water quantity in the channel, efforts should be made to eradicate invasive species of plants throughout the watershed.



Arundo donax has invaded many sections of the river

Encourage the growth of appropriate native riparian and upland vegetation.

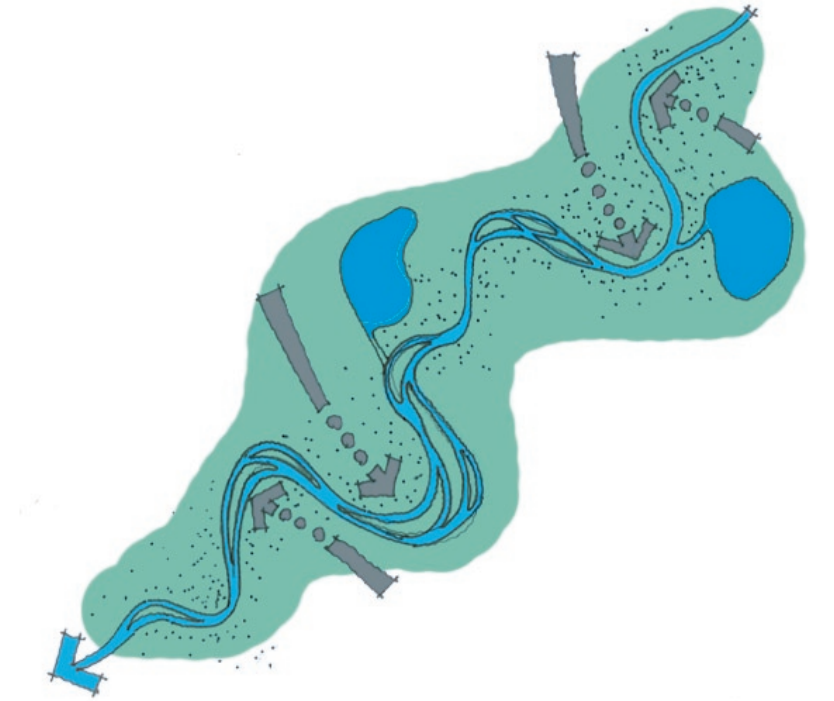
Appropriate and continuous native riparian vegetation has direct benefits to hydrology and water quality. Continuous native vegetation communities form upland canyons and slopes to the riparian river valley create conditions needed to encourage wildlife to move between the canyons and the river. As indicated in the preceding recommendation, inappropriate vegetation impedes flow and squanders water. Exotic species should be removed, and the areas replanted with native species. Best management practices should be implemented to encourage the propagation of existing native species.

Less-dense, native vegetation will cause significantly fewer circulation problems and require less water than invasive species. Additionally, a variety of a native species may be used to more effectively “cleanse” urban runoff through nutrient uptake. By spreading the area of contact of the river and river bed, groundwater infiltration can be increased. When combined with vegetation, pollutant filtration and removal can be increased. In certain situations, contaminated groundwater can be treated through phytoremediation, or biological filtration through uptake. Such an approach would require careful study and should not displace native habitat in the corridor.

Re-contour the channel to encourage meander and braiding.

Over the past decades, the river has become increasingly channelized by projects that seek to transport water from higher to lower elevations in the most efficient manner. Most efficient has often meant minimizing space for the river to maximize land available for development. The net result of these projects is a relatively straight channel with artificially raised banks. This condition has removed the river’s natural meander and braiding, depriving it of its natural flood cycle. The term meander refers to a river’s naturally winding path; braiding refers to river that has carved multiple simultaneous channels, diverging from and rejoining itself. Both of these river patterns (contrasted to a straightened, channelized path) contribute to greater riparian habitat, greater groundwater recharge and reduced velocity. Without meanders and braiding, the river’s current channel is shorter overall. With the same amount of water concentrated in less space, flow velocities are relatively higher than before channelization.

Although it is impractical to consider returning the floodplain to the river in any substantial form, it is possible to increase river length and decrease flow velocities. Where possible, the low flow portion of the channel should be reshaped to include meanders. By increasing the river length, there is an inherent increase in the riparian corridor and available habitat. The longer reaches also result in decreased flow velocities.



A braided meandering river supporting a broad riparian environment that filters urban runoff



Channelization of Tecolote Creek

Expand the river’s recharge area.

In conjunction with the preceding recommendation and where such opportunities exist, the river’s length can be increased-via meander-by removing artificial levees that constrain the river. A number of such floodplain expansion programs have been successfully executed throughout the country on similar rivers; these programs have paid careful attention to the potential risks associated with flooding and have proved to manage the risks well.

Past development in the floodplain and projects that have channelized the river exacerbate flooding problems and increase the potential economic damage of major flood events. Development should look for ways to provide future projects that would not degrade the river’s natural carrying capacity, water quality or riparian habitat. Such land use decisions should be made with sensitivity to the river.

Expanding wetlands and creating new ones through restoration or construction will contribute to improving water quality by filtering pollutants and will serve as a refuge for native flora and fauna, allowing them to re-establish after flood events.

The hydrologic junction between fresh water and salt water at the estuary is especially sensitive. Conditions that encourage the growth of exotic species should be eliminated. Back waters off the estuary should be created to serve as wildlife refuges and buffer against future damaging events such as the 1983 flood.

Adopt programs to reduce/remove non-point source loads

Preventing pollution at its source is the best and most cost effective approach to improve the water quality of the San Diego River. During wet weather events, the first flush of contaminants from most urban and suburban surfaces is transported directly into the river via storm drain systems. Ongoing low flow in these systems continues to trickle contaminants into the river. Although the City has a relatively advanced program to identify pollutants and to educate citizens in this area, a significant quantity of pollutants continue to enter the river via storm drains.

Stormwater is governed by the San Diego Municipal Storm Water NPDES permit. The permit directs municipalities to implement an urban runoff management program on a jurisdictional and watershed level. The intent is to prohibit pollutant discharges into the storm water conveyance system, implement best management practices, ensure that storm water discharges do not cause exceeding of water quality objectives, identify and eliminate sources of illicit discharges, and enforce local municipal water quality related ordinances.

The City should acknowledge the linkages between land use in urban and suburban developments to impacts on the river, and develop comprehensive programs to eliminate these detrimental effects by implementing high standards on new development and redevelopment as it relates to non-point source runoff. Some examples include requiring compliance with numeric standards, mandatory structural practices (swales, infiltration basins), and mandatory non-structural practices (restricted irrigation, aggressive street cleaning). Localized approaches to non-point source pollutant reduction/elimination is the only alternative to massive, in-channel treatment approaches. Highway and golf course runoff is of particular concern. Responsible agencies need to treat storm water runoff from highways prior to its reaching the river. Golf courses are traditionally maintained through intensive turf management. Course managers should be encouraged to create water quality buffers adjacent to the river and to implement sustainable management techniques that reduce the use of chemical based pest and weed control and fertilization.



FSDRIP Ponds



Riverwalk Golf Club

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